

Earth Observing-1



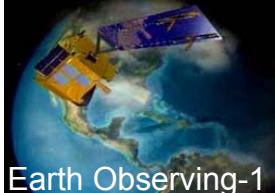
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Section 15

LEISA Atmospheric Corrector (LAC) Design Overview

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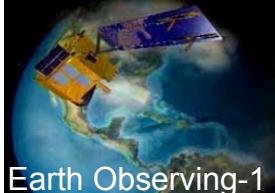
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Instrument Characteristics



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- ◆ ***Correct High Spatial Resolution Multispectral Imager Data for Atmospheric Effects***
- ◆ ***Hyperspectral Imager***
- ◆ ***Moderate Spectral Resolution (<10 nm)***
- ◆ ***Moderate Spatial Resolution (<300 meter)***
- ◆ ***Minimize Impact on Spacecraft Resources***
- ◆ ***Maximize Flexibility***



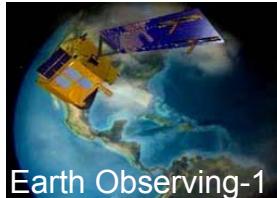
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Contribution to EO-1



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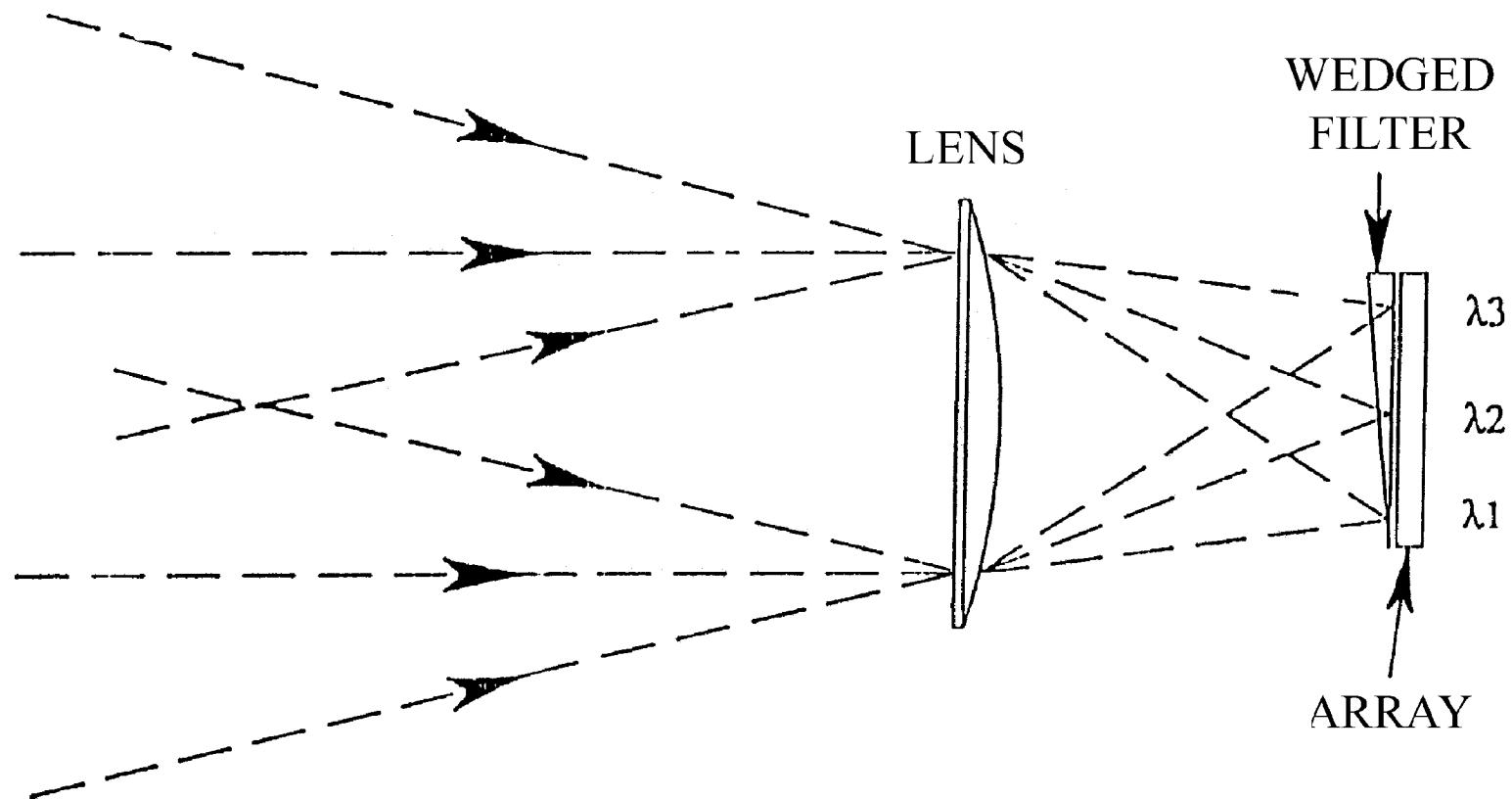
- ◆ ***Validation of Wedged Filter Approach for Spacecraft Instrumentation***
- ◆ ***Atmospheric Correction for ALI Multispectral Images***
- ◆ ***Atmospheric Correction for Landsat-7 Images (Formation Flying)***
- ◆ ***Direct Study of Spatial Resolution Degradation (Cross-Comparison with Hyperion)***
- ◆ ***Retrieved Atmospheric Parameters***
- ◆ ***Cross-Comparisons with MODIS***

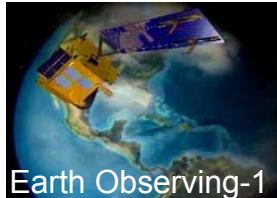


Wedged Filter Operation



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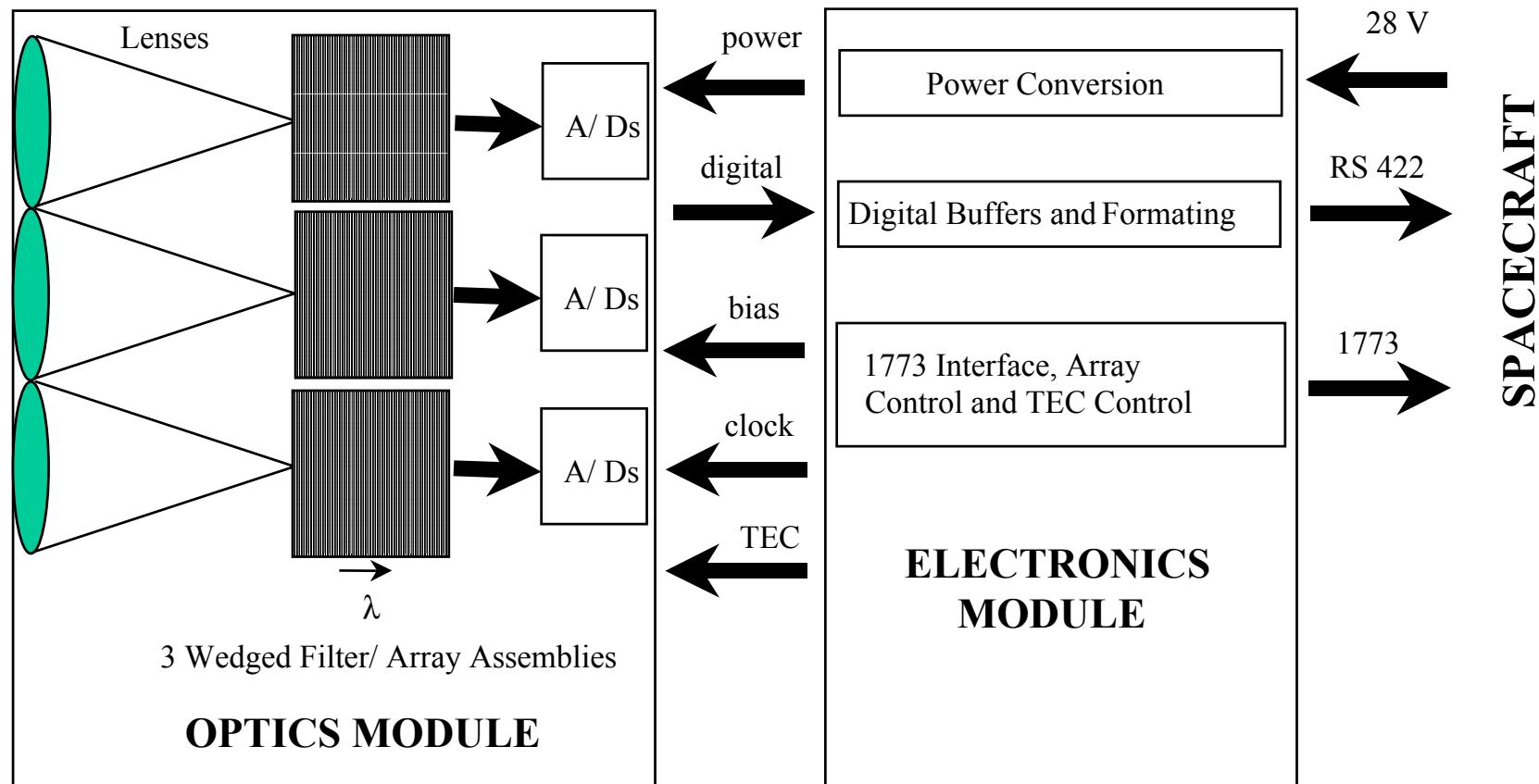


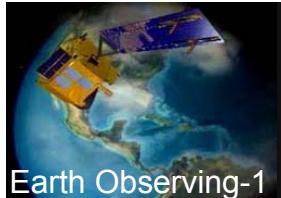


Block Diagram



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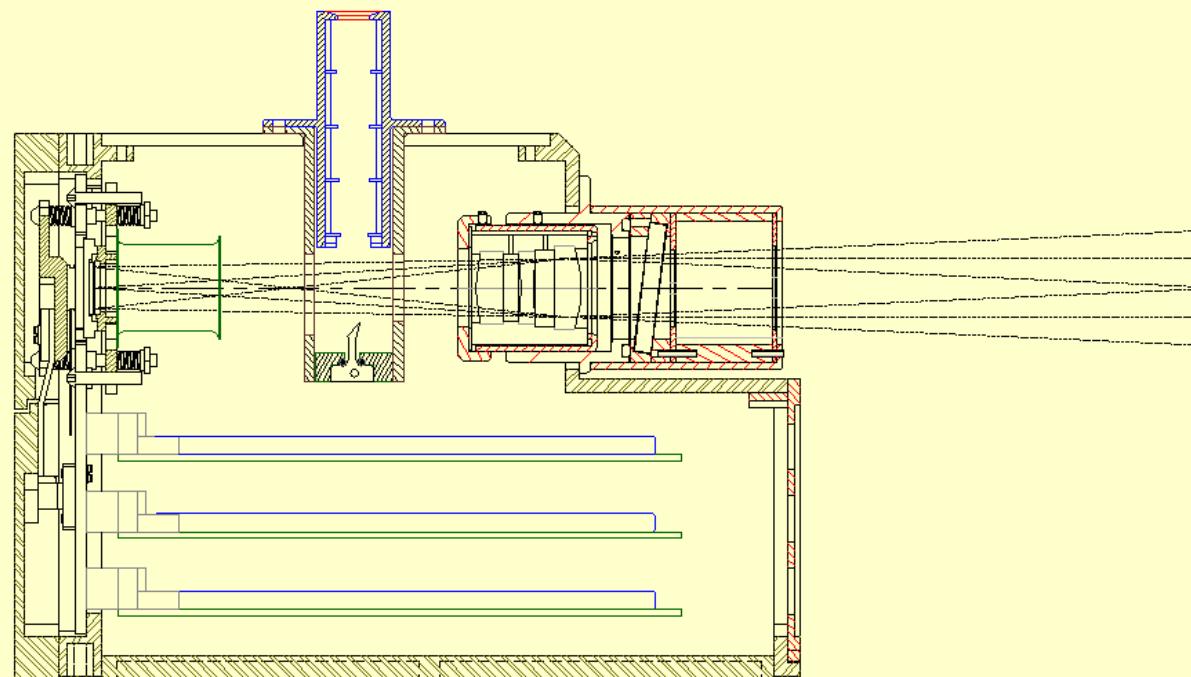


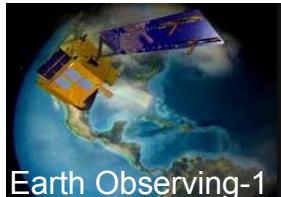
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Optics Module Detail



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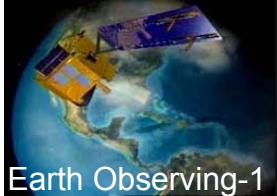
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Comparative Size



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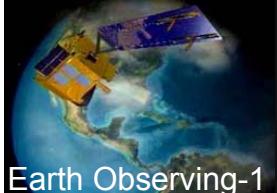
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Specifications



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- ◆ **Spectral Coverage:** ~0.89 - 1.58 μm ; 256 Bands Selected for Optimal Correction of High Spatial Resolution Images.
- ◆ **Spectral Resolution 2 Filter Sections:**
Section 1 ~35 cm^{-1} ($\Delta\lambda$: 5 nm @ 1.2 μm , 9 nm @ 1.6 μm)
Section 2 ~55 cm^{-1} ($\Delta\lambda$: 4 nm @ 0.9 μm , 8 nm @ 1.2 μm)
- ◆ **Swath Width:** ~185 km; Matches Landsat
- ◆ **Spatial Resolution (pixel):** 356 μradian (250 meter @ 705 Km).
- ◆ **Three 256 x 256 Element InGaAs Arrays; TEC Stabilized (<285 K).**
- ◆ **Three 15 Degree FOV 3 Element Lenses**
- ◆ **Two Modules: “Bolt-on”Optics Module and Electronics Module.**
- ◆ **Mass:** 10.5 kg (EM, 4.4 kg; OM 3.9 kg; Cable 2.2 kg)
- ◆ **Power:** 48 W (Peak); <15 W (Orbital Average)



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System Trades



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◆ ***Spatial Resolution vs. Spatial Coverage***

- *250 meter spatial resolution near maximum required for atmospheric correction especially if resampling*
- *185 km Matches Landsat7*
- *Requires three 256 x 256 arrays*

◆ ***IR vs. Visible Spectral Coverage***

- *IR gives better water vapor and cirrus cloud information at the expense of aerosol information*
- *InGaAs arrays now can cover 0.5 to 1.7 micron*
- *Cryogenic cooling not required*